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414190

THE UNIVERSITY OF MICHIGAN

## First Quarterly Progress Report

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Project Director

ORA PROJECT 05750

FLIGHT ACCESSORIES LABORATORY  
AERONAUTICAL SYSTEMS DIVISION  
AIR FORCE SYSTEMS COMMAND  
UNITED STATES AIR FORCE  
WRIGHT-PATTERSON AIR FORCE BASE, OHIO  
CONTRACT NO. AF 33(657)-1154C

ANN ARBOR

August 1963

"To expedite dissemination of information, this report is being forwarded for your information prior to review and approval by the ASD project officer and is, therefore subject to change. Any comments which you may have should be forwarded to ASD (Mr. Charles L. Delaney), Wright-Patterson AFB, Ohio, within 15 days of receipt to insure correction of errors before final approval is given."

DDC  
SEP 3 1964

## POOL BOILING STUDIES

C. Phillip Colver

The pool boiling investigation with potassium was completed during July. Thermocouple and power leads, water pipes, etc. were then disconnected from the equipment and the apparatus including filling system and knockout drum transported to our loop facilities for cleaning. The cleaning procedure consisted of alternately rodding and flushing with methanol and methanol-water mixtures. All lines having Swagelok connections were disconnected and cleaned separately. Valves which had come in contact with potassium were completely disassembled and cleaned.

Reinstallation of the equipment is now well under way. With the exception of the guard heaters all connections have been completed. Testing of the equipment and instrumentation will commence shortly. The boiling system and auxiliary lines will again be made helium tight up to 200 psig. All thermocouples will be checked. To assure complete cleanliness, the apparatus will be flushed several times with cleaning solution and then distilled water. It is expected to charge sodium to the system after the first of next month.

## FORCED CIRCULATION STUDIES

R E Barry

The objective of this program is to study the effect of a swirl device on the heat transfer characteristics of sodium and potassium. These fluids will be in forced circulation as a liquid vapor mixture ranging from zero to 100 per cent quality. The studies are to be carried out in the forced circulation loop constructed under Contract

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AF33(616)-8277. In this loop, potassium is preheated to a desired quality by means of external resistance heaters and then passes through a test section consisting of a length of 1/2-inch tube. Sodium vapor condensing on the outside of this tube supplies heat at a rate of 1-million Btu/(hr)(sq ft). A condenser, a cooler, and a pump completes the circuit.

The initiation of experimental work with a swirl device inserted in the test section or with another working fluid, depends upon the successful completion of the present studies with potassium in a straight tube. Then the plan is to install the swirl device using potassium as the working fluid, then use the device with sodium and finally, run sodium with the device removed.

At the present time, the studies with potassium in a straight tube have not yet been completed. However, we have installed a hot trapping system to enable us to remove any oxides formed when the test section is cut open for alterations. This system consists of a bed of zirconium chips through which 1200°F fluid is passed.